No. 200000169

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Utah State University

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED, PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE , OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. IN THE UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS SPECIFIED BY THE OWNER OF THE RIGHTS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

BARLEY

'Millennium'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this fourteenth day of April, in the year of our Lord two thousand.

Attest:

Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

REPRODUCE LOCALLY. *Include form number and date on all reproductions.* FORM APPROVED - OMB NO. 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY DIVISION - PLANT VARIETY PROTECTION OFFICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions and information collection burden statement on reverse)

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S) *(as it is to appear on the Certificate)*
Utah State University

2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER
UT94B1058-4603

3. VARIETY NAME
Millennium

4. ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP Code, and Country)*
Logan, UT 84322

5. TELEPHONE *(include area code)*
435-797-2243

6. FAX *(include area code)*
435-797-3376

FOR OFFICIAL USE ONLY

PVPO NUMBER 200000169

FILING DATE: 2-25-2000

FEES RECEIVED
FILING AND EXAMINATION FEE: $ 2450.00
DATE: 2-25-2000
CERTIFICATION FEE: $ 300
DATE: MAR 15 00

7. GENUS AND SPECIES NAME
Hordeum vulgare

8. FAMILY NAME *(Botanical)*
Poaceae (Gramineae)

9. CROP KIND NAME *(Common name)*
Barley

10. IF THE APPLICANT NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION *(corporation, partnership, association, etc.) (Common name)*
State University

11. IF INCORPORATED, GIVE STATE OF INCORPORATION

12. DATE OF INCORPORATION

13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS
Dr. Rulon S. Albrechtsen
Plants, Soils, & Biometeorology Dept.
Utah State University
Logan, UT 84322-4820

14. TELEPHONE *(include area code)*
435-797-2243

15. FAX *(include area code)*
435-797-3376

16. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED *(Follow instructions on reverse)*

a. ☒ Exhibit A. Origin and Breeding History of the Variety
b. ☒ Exhibit B. Statement of Distinctness
c. ☒ Exhibit C. Objective Description of the Variety
d. ☒ Exhibit D. Additional Description of the Variety *(Optional)*
e. ☒ Exhibit E. Statement of the Basis of the Applicant's Ownership
f. ☒ Voucher Sample *(2,500 viable untreated seeds or, for tuber propagated varieties verification that tissue culture will be deposited and maintained in an approved public repository)*
g. ☒ Filing and Examination Fee ($2,450), made payable to "Treasurer of the United States" *(Mail to PVPO)*

17. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY, AS A CLASS OF CERTIFIED SEED? *(See Section 83(a) of the Plant Variety Protection Act)*
☒ YES *(If "yes," answer items 18 and 19 below)* ☐ NO *(If "no," go to item 20)*

18. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?
☒ YES ☐ NO

19. IF "YES" TO ITEM 18, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED?
☒ FOUNDATION ☒ REGISTERED ☒ CERTIFIED

20. HAS THE VARIETY OR A HYBRID PRODUCED FROM THE VARIETY BEEN RELEASED, USED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES?
☐ YES *(If "yes," give names of countries and dates)* ☒ NO

21. The applicant(s) declare that a viable sample of basic seed of the variety will be furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate.

The undersigned applicant(s) is(are) the owner(s) of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.

Applicant(s) is(are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF APPLICANT *(Owner(s))*	SIGNATURE OF APPLICANT *(Owner(s))*
NAME *(Please print or type)*: WAYNE H. WATKINS	NAME *(Please print or type)*: H. PAUL KASMUSSEN
CAPACITY OR TITLE: DIRECTOR TECHNOLOGY COMMERCIALIZATION	DATE: 22 FEB 2000
CAPACITY OR TITLE: Director	DATE: 2-24-2000

STD-470 (03-86) *(Previous editions are to be destroyed)*

(See reverse for instructions and information collection burden statement)

Exhibit A - Origin and Breeding History

MILLENNIUM

Summer, 1989: Original cross made at Logan, Utah, by Dr. Rulon S. Albrechtsen

Cross number was UTB1058

UTB1058 = UT87B603-1266/UT Short #2

UT87B603-1266 = WA641566/UT Short #2

WA641566 = WA Sel. 3564/'Unitan'
WA641566 = a sib to 'Steptoe'

UT Short #2 = UTB2-1694-1997

UTB2-1694-1997 = S.D.S.S./'Primus'

S.D.S.S. = a South Dakota breeding line
Primus = a South Dakota variety

Winter, 1989-90: F_1 plants grown in the greenhouse at Logan, Utah.

There was no segregation observed in F_1 plants.

Summers, 1990, 1991 and 1992: F_2 through F_4 generation plants grown in the field at Logan, Utah in space-planted (plants 6 inches apart with 12-inch row spacing) modified bulk populations which were selected for plants possessing the following characteristics:

- Four or more fertile tillers per plant in space-planted stands
- Early to mid-season heading date
- Early to mid-season maturity date
- Less than 90 cm tall
- Zero to near-zero lodging
- Upright stems
- Desirable plant confirmation
- Plump seeds
- White aleurone
- Complete exertion of spike from flag leaf at maturity
- Tough (not brittle) stem and neck
- Lemma awns longer than spike

- Free of barley loose smut (caused by *Ustilago nuda* (Jens.) Rostr.)
- Free of barley covered smut (caused by *Ustilago hordei* (Pers.) Lagrh.)
- Moderately free of powdery mildew (caused by *Erysphe graminis* DC. f sp. *hordei* Em. marchal)

Selected seed was bulked for each succeeding generation.

Summer, 1993: F_5 plants grown at Logan, Utah in a space planted (plants 6 inches apart with 12-inch row spacing) modified bulk population and single heads were selected from 224 plants possessing the same characteristics as those listed for the F_2 through F_4 generations. Seed from individual heads was maintained separately.

Summer, 1994: Seed from the 224 individual selected heads was grown in F_6 head rows at Logan, Utah, where all rows were evaluated for the same characteristics as those listed for the F_2 through F_5 generations. Only desirable rows were harvested. Seed from harvested rows was subjected to protein evaluation and kernel rating in the laboratory. Row 4603 (identified as UT90B1058-4603) was selected as a single head row for additional testing. It was found to breed true for rough lemma awns.

Summer, 1995: UT94B1058-4603 was evaluated for yield and test weight, in addition to the characters listed for the F_6 head rows, in a single-replicate preliminary irrigated yield test (which included Steptoe check plots) grown at Logan, Utah.

Summers, 1996 through 1999: UT94B1058-4603 was evaluated for the same characters listed for the preliminary irrigated yield test, in replicated irrigated yield tests at four major irrigated barley production sites in Utah. It was the top-yielding entry (among 48 entries) in all four years, averaged over 4 locations each year (a total of 16 location years).

Summers, 1997 and 1998: UT94B1058-4603 was evaluated for the same characters listed for the replicated Utah irrigated yield tests, in the Western Regional Spring Barley Nursery grown at 12 locations in 1997 and 11 locations in 1998 (identified as UT004603). It ranked 2nd in yield in 1997 (among 32 entries) and 1st in 1998 (among 30 entries), averaged over all locations.

Summers, 1997 through 1999: UT94B1058-4603 was evaluated for the same characters listed for the replicated Utah irrigated yield tests, in replicated dryland yield tests at two major dryland barley production sites in Utah.

Summer, 1997, and 1998: UT94B1058-4603 was evaluated for the same characters listed for the replicated Utah dryland yield tests, in the Western Regional Dryland Spring Barley Nursery grown at 8 locations in 1997 and at 10 locations in 1998 (a total of 18 location years), where it was identified as UT004603. It ranked 3rd in yield in 1997 (among 30 entries) and 9th in 1998 (among 31 entries).

Summer, 1997: Selected 400 heads of UT94B1058-4603 to be used for production of Breeder seed.

Summer, 1998: Breeder seed of UT94B1058-4603 was produced at Logan, Utah, from the 400 heads selected in 1997. Selected heads were grown in individual head rows. Questionable rows were rogued out. Remaining rows were harvested in bulk.

Summer, 1999: Foundation seed of Millennium (UT94B1058-4603) was produced at Logan, Utah, from Breeder seed produced in 1998. The Foundation field was rogued heavily for any questionable plants.

Summer, 2000: Registered seed of Millennium will be produced by five selected Utah growers.

Summer, 2001: Certified seed of Millennium will be produced by selected growers.

March, 2002: Certified seed of Millennium will be marketed for commercial production.

Millennium has been observed to be stable for 6 generations (beginning with the F_6 head row from which it originated in 1994, through the F_{11} Foundation field produced in 1999). There have been no variants observed. Any questionable plants rogued from Breeder and Foundation plantings showed very minor, if any, variation and were likely due to environmental variations. They were removed strictly as a precautionary measure.

Exhibit B - Novelty Statement for Millennium

To our knowledge, **Millennium** most nearly resembles Steptoe and Walker barleys. Differences between Millennium and the other two varieties include, but are not restricted to, the following characteristics:

1. Head shape of Millennium and Walker is tapering, while that of Steptoe is slightly tapering (Figures 1 & 2).

2. Head density of Millennium [Erect (Not dense), (2.4 - 2.7 mm/internode)] is similar to that of Walker [Erect (Not dense), (2.7 - 2.9 mm/internode)], but is more dense than that of Steptoe [Lax, (3.2 - 3.5 mm/internode)], (Figures 2 & 3).

3. Millennium has some overlap of lateral kernels at the tip of the head (similar to Steptoe), while Walker has none (Figure 2).

4. Millennium, Steptoe, and Walker all have the rachis edges covered with hair, but the hairs are distinctly longer on Steptoe and Millennium than they are on Walker.

5. Glume hair length for Millennium and Steptoe is long, while that for Walker is short.

6. Millennium, Steptoe, and Walker all have glume awns more than equal to the length of the glumes. However, the glume awns on Millennium are extremely long [Visible in Figure 2 (where they are not broken off)]. They are distinctly longer than on any other variety with which Millennium was compared.

7. The lemma base of Millennium has a depression, while Steptoe has a transverse crease, and Walker has a slight crease.

FORM APPROVED: OMB NO. 40-R3822

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
BELTSVILLE, MARYLAND 20705

EXHIBIT C
(Barley)

OBJECTIVE DESCRIPTION OF VARIETY
BARLEY *(HORDEUM VULGARE)*

INSTRUCTIONS: *See Reverse.*

NAME OF APPLICANT(S)
Utah Agricultural Experiment Station

ADDRESS *(Street and No. or R.F.D. No., City, State, and ZIP Code)*
Utah State University
Logan, UT 84322-4810

FOR OFFICIAL USE ONLY
PVPO NUMBER 20000169

VARIETY NAME OR TEMPORARY DESIGNATION
Millennium

Place the appropriate number that describes the varietal character of this variety in the boxes below.
Place a zero in first box (i.e. [0][8][9] or [0][9]) when number is either 99 or less or 9 or less.

1. GROWTH HABIT:

[1] 1 = SPRING 2 = FACULTATIVE WINTER 3 = WINTER

[3] Early Growth: 1 = PROSTRATE 2 = SEMIPROSTRATE 3 = ERECT

2. MATURITY (50% Flowering):

[2] 1 = EARLY (California Mariout) 2 = MIDSEASON (Betzes) 3 = LATE (Frontier)

[ ] No. of days *Earlier* than ..... [ ]
[ ] No. of days *Later* than ..... [ ]
1 = BETZES 2 = CALIFORNIA MARIOUT 3 = CONQUEST 4 = DICKSON 5 = PIROLINE 6 = PRIMUS 7 = UNITAN

3. PLANT HEIGHT (From soil level to top of head):

[3] 1 = SEMIDWARF 2 = SHORT (California Mariout) 3 = MEDIUM TALL (Betzes) 4 = TALL (Conquest)

[ ][ ] Cm. *Shorter* than ..... [ ]
[ ][ ] Cm. *Taller* than ..... [ ]
1 = BETZES 2 = CALIFORNIA MARIOUT 3 = CONQUEST 4 = DICKSON 5 = PIROLINE 6 = PRIMUS 7 = UNITAN

4. STEM:

[2] Exertion *(Flag to spike at maturity)*: 1 = 0 - 3 cm. 2 = 3 - 10 cm. 3 = 10 - 15 cm.

[2] Anthocyanin: 1 = ABSENT 2 = PRESENT

[0][4] NO. OF NODES (Originating from node above ground)

[1] Collar Shape: Primarily 1 = CLOSED 2 = V-SHAPED 3 = OPEN 4 = MODIFIED CLOSED OR OPEN

[1] Shape of Neck: 1 = STRAIGHT 2 = SNAKY (see Fig. 4) 3 = OTHER (Specify) .

5. LEAF:

[1] Basal leaf sheath *(seedling)*: 1 = GLABROUS 2 = PUBESCENT

[2] Position of flag leaf *(at boot stage)*: 1 = DROOPING 2 = UPRIGHT

[3] Waxiness: 1 = ABSENT (Glossy) 2 = SLIGHTLY WAXY 3 = WAXY

[1][6] MM. WIDTH (First leaf below flag leaf) (W/L ratio = 0.665

[2][4] CM. LENGTH (First leaf below flag leaf)

[2] Anthocyanin in leaf sheath: 1 = ABSENT 2 = PRESENT (Faint)

6. HEAD: Basal rachis internode short and straight 2.4-2.7 mm/internode

[2] Type: 1 = TWO-ROWED 2 = SIX-ROWED

[2] Density: 1 = LAX 2 = ERECT (Not dense) 3 = ERECT (Dense) (See Fig. 3)

(See Figs. 1 & 2) [1] Shape: 1 = TAPERING 2 = STRAP 3 = CLAVATE 4 = OTHER (Specify)

[3] Waxiness: 1 = ABSENT (Glossy) 2 = SLIGHTLY WAXY 3 = WAXY

(See Fig. 2) [2] Lateral Kernels Overlap: 1 = NONE 2 = AT TIP 3 = 1/4 - 1/2 OF HEAD

more and longer than Brigham

[3] Rachis *(Hair on edge)*: 1 = LACKING 2 = FEW 3 = COVERED

7. GLUME:

[3] Length: 1 = 1/3 OF LEMMA 2 = 1/2 OF LEMMA 3 = MORE THAN 1/2 OF LEMMA

[3] Hairs: 1 = NONE 2 = SHORT 3 = LONG

[4] Hair covering: 1 = NONE 2 = RESTRICTED TO MIDDLE 3 = CONFINED TO BAND 4 = COMPLETELY COVERED

[4] Awns: 1 = LESS THAN EQUAL TO LENGTH OF GLUMES 2 = EQUAL TO LENGTH OF GLUMES 3 = MORE THAN EQUAL TO LENGTH OF GLUMES

4 = Extremely Long (Distinctly longer than any other variety with which it was compared), (Visible on Fig. 2)

[3] Awn Surface: 1 = SMOOTH 2 = SEMISMOOTH 3 = ROUGH

~~200000169~~

8. LEMMA: Erect awns (very little flaring) (See Fig. 1)

[5] **Awn:** 1 = AWNLESS 2 = AWNLETS ON CENTRAL ROWS, AWNLESS ON LATERAL ROWS 3 = SHORT ON CENTRAL ROWS, AWNLETS ON LATERAL ROWS 4 = SHORT (less than equal to length of spike) 5 = LONG (longer than spike) 6 = HOODED

[4] **Awn Surface:** 1 = AWNLESS 2 = SMOOTH 3 = SEMISMOOTH 4 = ROUGH

[3] **Teeth:** 1 = ABSENT 2 = FEW 3 = NUMEROUS

[1] **Hair:** 1 = ABSENT 2 = PRESENT

[1] Primarily **Shape of base:** 1 = DEPRESSION 2 = SLIGHT CREASE 3 = TRANSVERSE CREASE

[2] **Rachilla Hairs:** 1 = SHORT 2 = LONG

9. STIGMA:

[2] **Hairs:** 1 = FEW 2 = MANY

10. SEED:

[2] **Type:** 1 = NAKED 2 = COVERED

[1] **Hairs on Ventral Furrow:** 1 = ABSENT 2 = PRESENT

[4] **Length:** 1 = SHORT (8.0 mm.) 2 = SHORT TO MIDLONG (7.5 - 9.0 mm.) 3 = MIDLONG (8.5 - 9.5 mm.) 4 = MIDLONG TO LONG (9.0 - 10.5 mm.) 5 = LONG (10.0 mm.)

[3] **Wrinkling of hull:** 1 = NAKED 2 = SLIGHTLY WRINKLED 3 = SEMIWRINKLED 4 = WRINKLED

[1] **Aleurone Color:** 1 = COLORLESS (White or Yellow) 2 = BLUE

[0][3] PERCENT ABORTIVE

[3][9] GMS. PER 1000 SEEDS

11. DISEASE: (0 = Not Tested, 1 = Susceptible, 2 = Resistant), 3=Moderately Resistant, 4=Moderately Susceptible

[0] SEPTORIA	[0] NET BLOTCH	[0] SPOT BLOTCH	[3] POWDERY MILDEW
[2] LOOSE SMUT	[0] BACTERIAL BLIGHT	[2] COVERED SMUT	[0] FALSE LOOSE SMUT
[0] STEM RUST	[0] LEAF RUST	[0] SCAB	[0] SCALD
[0] AY	[2] BSMV	[0] BYDV	[4] OTHER (Specify) Barley Stripe Rust

12. INSECT: (0 = Not tested, 1 = Susceptible, 2 = Resistant)

[0] GREEN BUG	[0] ENGLISH GRAIN APHID	[0] CHINCH BUG	[0] ARMYWORM
[1] GRASS HOPPERS	[1] CERIAL LEAF BETTLE	[1] OTHER (Specify) Russian wheat aphid	

HESSIAN FLY RACES: [0] GP [0] A [0] B [0] C [0] D [0] E [0] F [0] G

13. CHEMICAL (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

[0] DDT

[ ] OTHER (Specify) ______

14. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED:

CHARACTER	NAME OF VARIETY	CHARACTER	NAME OF VARIETY
Plant tillering	Rollo	Seed size	Brigham
Leaf size	Steptoe	Coleoptile elongation	Statehood
Leaf color	Steptoe	Seedling pigmentation	Steptoe
Leaf carriage	Steptoe		

REFERENCES: The following publications may be used as a reference aid for the standardization of character descriptions and terms used in this form:

1. Wiebe, G. A., and D. A. Reid, 1961, Classification of Barley Varieties Grown in the United States and Canada in 1958, Technical Bulletin No. 1224, U.S. Dept. of Agriculture.
2. Reid, D. A., and G. A. Wiebe, 1968, Barley: Origin, Botany, Culture, Winter Hardiness, Genetics, Utilization, Pests, Agriculture Handbook No. 338, U.S. Dept. of Agriculture. pp. 61 - 84.
3. Malting Barley Improvement ~~Association, Milwaukee, Wisconsin~~, 1971, Barley Variety Dictionary.

COLOR: Nickerson's or any recognized color fan may be used to determine color of the described variety.

FORM LPGS-470-5 (8-80) (REVERSE)

Exhibit D - Additional Description of Millennium

Millennium resembles Brigham and Century in some respects. Differences between Millennium and the other two varieties include, but are not limited to, the following characteristics:

1. Neck shape of Millennium is classified as straight, while that of Century is semisnaky, and that of Brigham is snaky (Figure 4). Figure 4 does not give an accurate portrayal of the snaky neck shape of Brigham. The photograph shows only one dimensional bending of the stem, while in actuality, bending occurs in two or more directions. No other variety with which Brigham was compared has this characteristic.

2. Head shape of Millennium is tapering, while that of Brigham is slightly tapering, and that of Century is strap (Figures 1 & 2).

3. Head density of Millennium [Erect (Not dense), (2.4 - 2.7 mm/internode)] is similar to that of Brigham [Erect (Not dense), (2.6 - 2.8 mm/internode)], but is more dense than that of Century (Lax, 3.0 - 3.2 mm/internode) (Figures 2 & 3).

4. Millennium and Century have some overlap of lateral kernels at the tip of the head, while Brigham has none (Figure 2).

5. Millennium, Brigham, and Century all have the rachis edges covered with hair, but the hairs are distinctly longer on Millennium than they are on Brigham or Century.

6. Glume length for Millennium and Century is more than ½ of the lemma, while that of Brigham is ½ that of the lemma.

7. Glume hair length for Millennium and Brigham is long, while that for Century is short.

8. Glume hair covering for Millennium and Brigham is complete, while that for Century is confined to a band.

9. Glume awns for Brigham and Walker are equal to the length of the glumes, while those for Millennium are exceptionally long [Visible in Figure 2 (where they are not broken off)]. They are distinctly longer than on any other variety with which Millennium was compared.

10. Glume awn surface of Millennium is rough, while that of Brigham is semirough, and that of Century is semismooth.

11. Millennium has erect lemma awns, while those for Century are slightly flaring, and those for Brigham are widely flaring (Figure 1). The lemma awns on Brigham flare distinctly wider than on any other variety with which it was compared.

12. The lemma awn surface of Millennium and Century is rough, while that of Brigham is semirough.

13. The lemma base of Millennium has a depression, while Brigham has a slight crease, and Century has a transverse crease.

REPRODUCE LOCALLY. *Include form number and edition date on all reproductions.* FORM APPROVED - OMB NO. 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

EXHIBIT E
STATEMENT OF THE BASIS OF OWNERSHIP

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

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1. NAME OF APPLICANT(S)	2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER	3. VARIETY NAME
Utah State University	UT94B1058-4603	Millennium
4. ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP, and Country)*	**5. TELEPHONE** *(include area code)*	**6. FAX** *(include area code)*
Logan, UT 84322	(435) 797-2243	(435) 797-3376
	7. PVPO NUMBER 200000169	

8. Does the applicant own all rights to the variety? *Mark an "X" in appropriate block.* If no, please explain. [X] YES [ ] NO

9. Is the applicant (individual or company) a U.S. national or U.S. based company? [X] YES [ ] NO
If no, give name of country

10. Is the applicant the original owner? [X] YES [ ] NO *If no, please answer one of the following:*

a. If original rights to variety were owned by individual(s), is (are) the original owner(s) a U.S. national(s)?

[ ] YES [ ] NO If no, give name of country

b. If original rights to variety were owned by a company(ies), is(are) the original owner(s) a U.S. based company?

[ ] YES [ ] NO If no, give name of country

11. Additional explanation on ownership *(if needed, use reverse for extra space)*:

Millennium (UT94B1058-4603) was originated and developed by Dr. Rulon S. Albrechtsen, plant breeder at the Utah Agricultural Experiment Station at Utah State University, Logan, Utah. By agreement between employee and the Utah Agricultural Experiment Station and Utah State University, all rights to any invention, discovery or development made by an employee are assigned to the employer. No rights to such invention, discovery, or development are retained by the employee.

PLEASE NOTE:

Plant variety protection can be afforded only to owners (not licensees) who meet one of the following criteria:

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country which affords similar protection to nationals of the U.S. for the same genus and species.

2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by nationals of a country which affords similar protection to nationals of the U.S. for the same genus and species.

3. If the applicant is an owner who is not the original owner, both the original owner and the applicant must meet one of the above criteria.

The original breeder/owner may be the individual or company who directed final breeding. See Section 41(a)(2) of the Plant Variety Protection Act for definition.

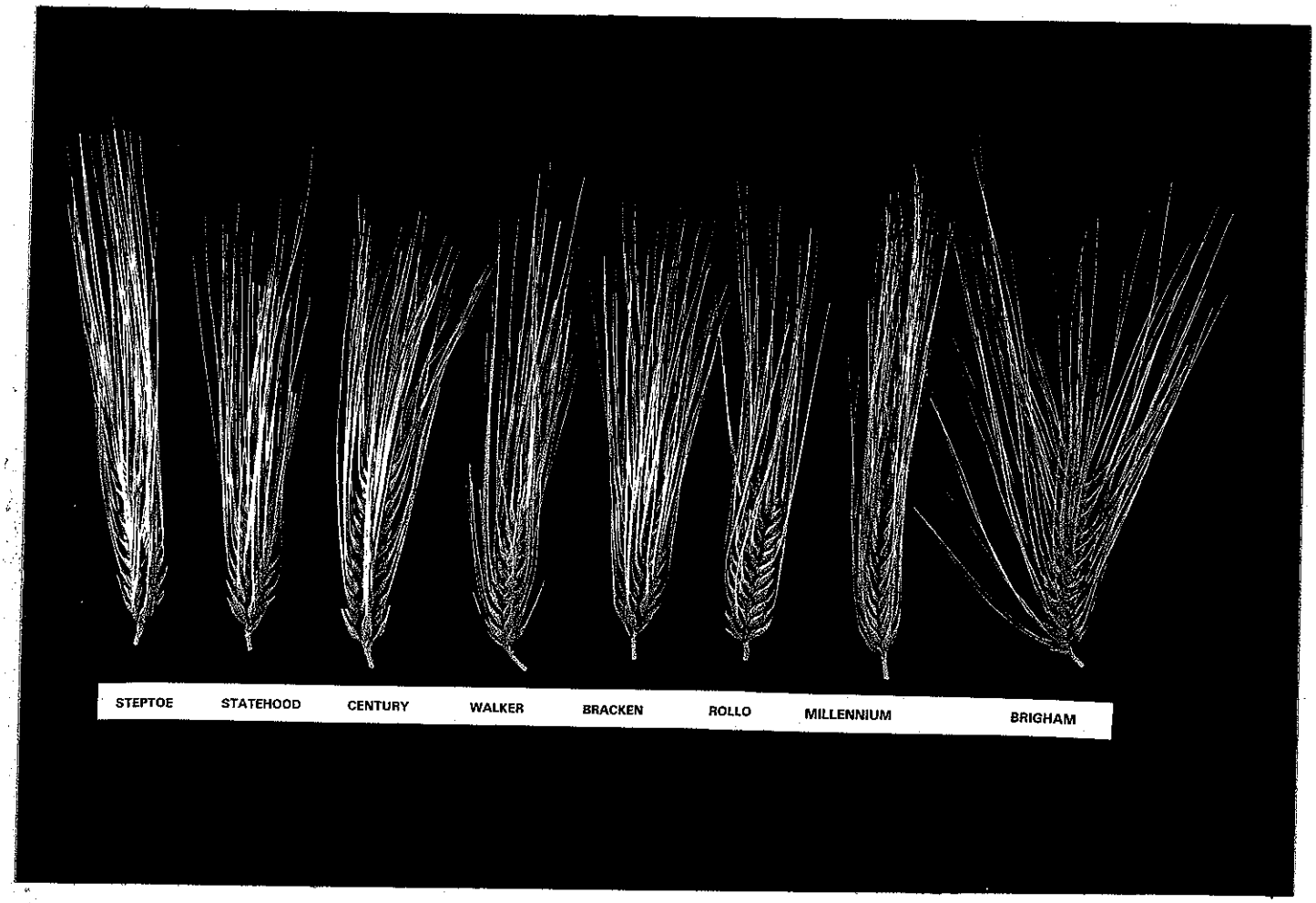

Fig. 1. General head and lemma awn characteristics of Millennium and comparative barley varieties. Note widely flaring lemma awns for Brigham.

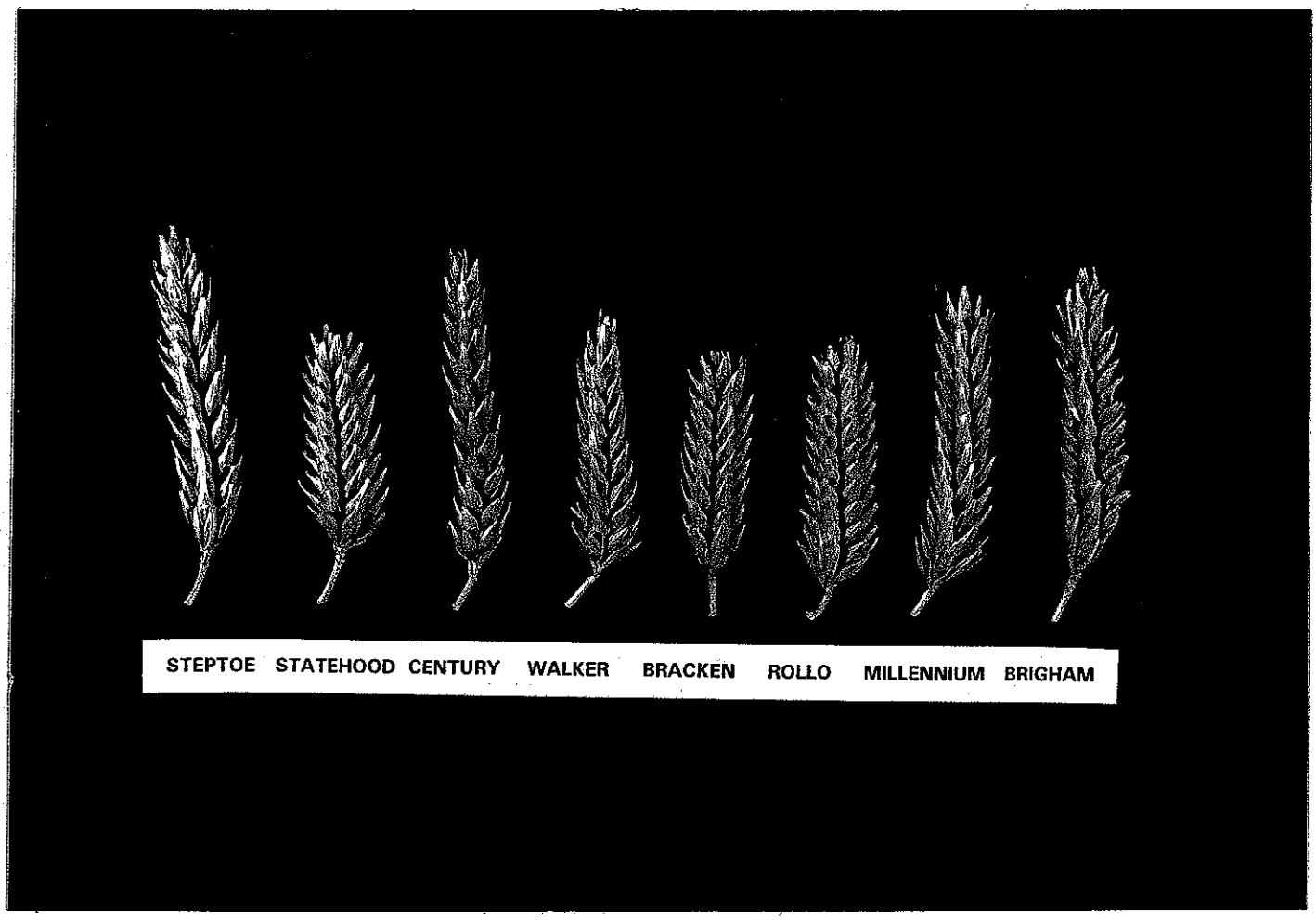

Fig. 2. Comparisons of head density, head shape and lateral kernel overlap for Millennium and comparative barley varieties. Also note visible very long glume awns on Millennium.

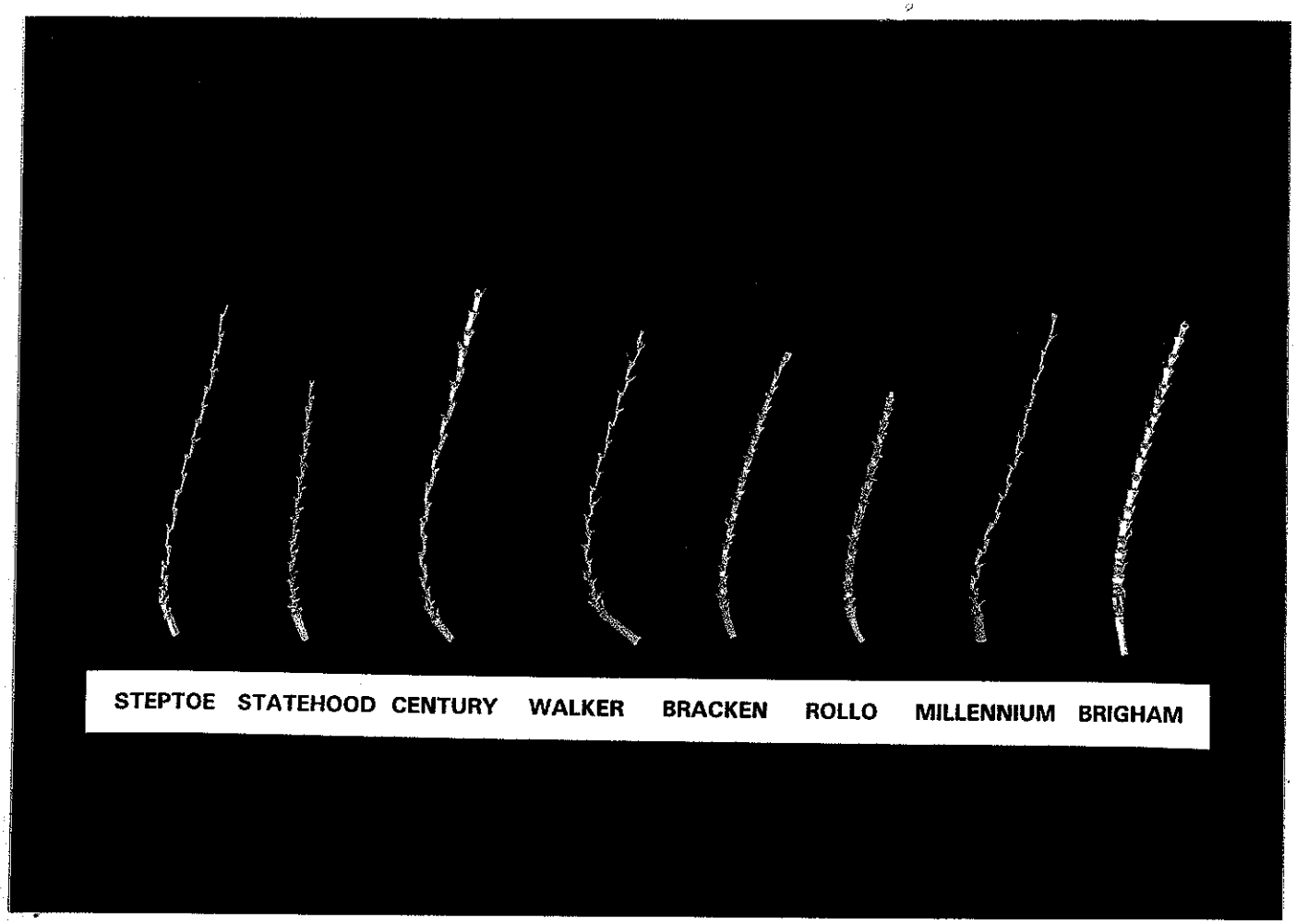

Fig. 3. Comparisons of head density for Millennium and comparative barley varieties.

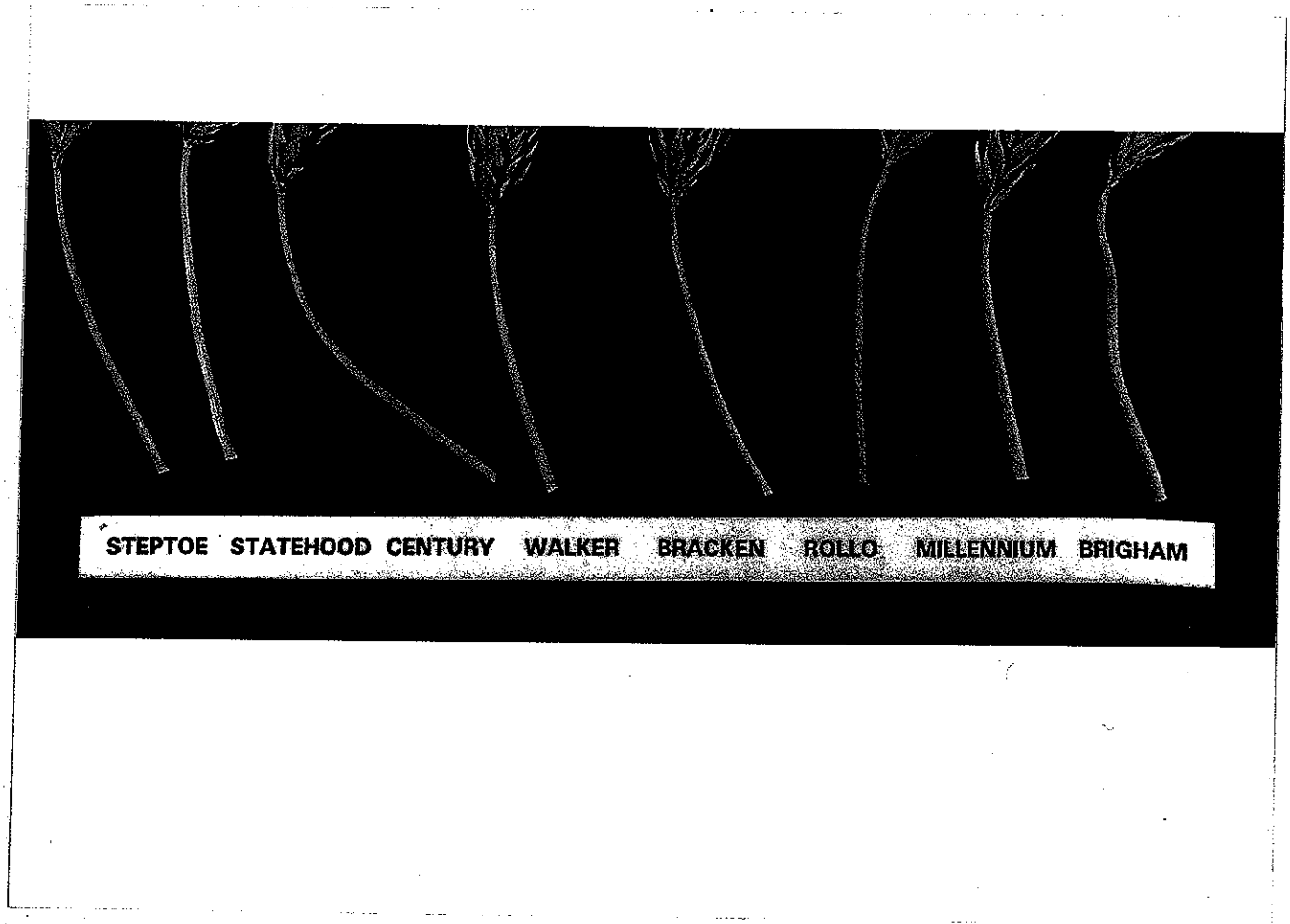

Fig. 4. Comparisons of neck shape for Millennium and comparative barley varieties. Note snaky neck shape for Brigham.